GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2024

Subject Code:3160610   **Date:15-05-2024**

Subject Name:Water Resources Engineering and Hydrology

Time:10:30 AM TO 01:00 PM   **Total Marks:70**

Instructions:
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Define: Hyetograph, infiltration, Runoff	**03**
	(b)	Explain (1) Thiessen polygon method (2) Isohyetal method, to find average depth of rainfall.	**04**
	(c)	Enlist recording and non-recording type of rain gauges. Explain any one non-recording type of rain gauge with a neat sketch.	**07**
Q.2	**(a)**	Define: Drainage basin, Drainage density, Stream density	**03**
	(b)	Write down the assumptions and limitations of unit hydrograph theory.	**04**
	(c)	The direct runoff hydrograph resulting from a 6.0 cm effective rainfall of 6 hr duration is given below. Determine the area of the catchment and the ordinates of the 6 hr unit hydrograph. Also sketch 6 hr unit hydrograph.	**07**

Time (hrs)	00	06	12	18	24	30	36	42	48
Direct runoff (m^3/s)	00	30	170	315	360	300	240	170	120
Time (hrs)	54	60	66	72					
Direct runoff (m^3/s)	70	30	10	00					

OR

	(c)	Find the ordinates of a storm hydrograph resulting from a 3 hours storm with rainfalls of 2.45, 7.20 and 4.25 cm during subsequent 3 hours intervals. The ordinates of unit hydrograph(O.U.H.) are given below:	**07**

Time (hrs)	03	06	09	12	15	18	21	24	03	06
O.U.H. (cumecs)	0	115	340	530	370	320	260	225	175	130
Time (hrs)	09	12	15	18	21	24				
O.U.H. (cumecs)	80	65	50	30	15	0				

Assume an initial loss of 5 mm, infiltration index 2.55 mm/hour and base flow of 30 cumecs.

Q.3	**(a)**	Explain types of sediment load.	**03**
	(b)	Explain Darcy's law with its limitation?	**04**

(c)	An unconfined aquifer has a thickness of 40 m. A fully penetrating 25 cm diameter well in this aquifer is pumped at a rate of 30 lit/s. The drawdown measured in two observation wells located at distances of 10 m and 120 m from the well are 8 m and 0.75 m respectively. Determine the average hydraulic conductivity of the aquifer. At what distance from the well the drawdown is insignificant.		**07**

OR

Q.3	**(a)**	List out the causes of sedimentation in reservoir and explain any two.	**03**
	(b)	Differentiate between Confined aquifer and Unconfined aquifer.	**04**
	(c)	A well 0.7 m in diameter penetrates fully a confined aquifer of thickness 30 m, having a conductivity of 1.5 m/day. It is expected that the drawdown in the well be limited to 2.75 m. Assuming that the radius of influence is 330 m, find the maximum discharge that can be pumped out of well.	**07**

Q.4	**(a)**	Distinguish between Gravity dam and Earth dam.	**03**
	(b)	Write a note on flood routing.	**04**
	(c)	Enlist different types of reservoirs. Explain each in brief.	**07**

OR

Q.4	**(a)**	Explain dams based upon their function.	**03**
	(b)	Explain flood frequency analysis.	**04**
	(c)	Explain the mass curve method to determine reservoir capacity.	**07**

Q.5	**(a)**	Explain classification of hydropower plant based on head.	**03**
	(b)	Write a note on check dam.	**04**
	(c)	What is the need for planning of water resources projects? Discuss the steps involved in the water resources planning.	**07**

OR

Q.5	**(a)**	Explain: Penstocks, Surge tank, Turbines	**03**
	(b)	Explain types of drought.	**04**
	(c)	Explain roof top rain water harvesting method with a neat sketch.	**07**

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